

# PATENT SPECIFICATION



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694,662

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## COMPLETE SPECIFICATION

### An Improved Hydraulic Relief Valve

We, THE PLESSEY COMPANY LIMITED, a British Company, of 56, Vicarage Lane, Ilford, Essex, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a hydraulic relief valve.

According to this invention the hydraulic relief valve valuable either as a normal relief valve or a differential relief valve consists of a valve body which contains an interchangeable valve guide or sleeve having discharge outlets, a spring loaded poppet or like valve which moves axially within the valve guide and is normally held upon a seating characterised in that the interchangeable guide has the discharge outlets so displaced that, for a normal relief valve, said outlets are immediately at the rear of the valve seating and for a differential relief valve the outlets are arranged behind the effective area of the poppet valve.

The terms "differential relief valve" and "effective area" in this specification are intended to infer that, when the valve is used so that the pressure of liquid upon reaching a predetermined pressure, lifts the valve off its seating the pressurised liquid then acts upon an additional surface of the valve, whereby it is opened fully in opposition to the spring loading and results in a fall in pressure.

The valve stem may be fitted with one or more rubber rings to obviate the valve from what is commonly known as "chattering."

The invention will now be described with reference to the accompanying drawings in which:—

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Fig. 1 is a sectional elevation of a relief valve and

Fig. 2 is a section of a valve guide.

Referring to the drawing:

A valve body 1 cast from suitable metal or alloy is formed with an inlet 2, and an outlet 3 for the admission and discharge of pressurised liquid, and one end of said valve body 1 is open to accommodate the valve components.

A valve guide 4 (when used as a simple relief valve) has a series of circumferential apertures or discharge outlets 6 immediately behind the valve seating. Said valve is removably fitted to the valve body 1 in such a manner that the pressurised liquid can flow through the apertures 6 from the inlet 2 to the outlets 3.

A poppet valve 7 moving axially in the valve guide 4 closes upon a valve seating 5. Said poppet valve 7 has a central bore 8 to receive a spindle 9. The portion of the spindle inserted into the valve 7 has several annular grooves 10, and rubber rings 11 are fitted into these grooves 10 which are a close fit with the bore. Abutting against the outer end of the valve 7 is a thimble 12. A compression spring 13 inserted over the valve spindle 9 engages at one end, a flange 14 formed upon the thimble 12, and at the other end a nut, cap or the like 16 located in the end of the valve body 1, whereby the valve 7 is normally held upon its seating under the compression of the spring loading. The compression of the spring 13 can be varied by turning the nut or the like in an anti-clockwise or clockwise direction.

With this construction the circumferential ring of apertures 6 are immediately behind the valve seating 5.

When the valve is intended to be used as a differential valve, the valve com-

ponents are removed from the valve body 1 and the valve guide 12 is replaced together with the other components by a valve guide 17 (Fig. 2) having a series of discharge outlets 18. The arrangement is such that upon re-assembly, the outlets 18 are at the rear of the stepped face of the valve 7.

In either arrangement the rubber rings on the valve stem are pressed against the surface of the valve bore under the influence of the pressures acting upon the valve, thus eliminating "chatter".

What we claim is:—

1. A hydraulic relief valve usable either as a normal relief valve or a differential relief valve consisting of a valve body which contains an interchangeable valve guide or sleeve having discharge outlets, a spring loaded poppet valve or the like which moves axially

within the valve guide and is normally closed upon a seating characterised in that the interchangeable valve guides have the outlets so displaced that, for a normal relief valve these said outlets are immediately at the rear of the valve seating, and for a differential relief valve the outlets are arranged behind the effective area of the poppet valve or the like.

2. A hydraulic valve according to Claim 1 wherein a stem is fitted with one or more flexible rings for receiving the poppet valve or the like.

3. A hydraulic valve according to Claim 1 wherein the poppet valve has a stepped face.

4. A hydraulic relief valve substantially as described with reference to Figs. 1 and 2 of the accompanying drawings.

W. E. P. BAYLY,  
For the Applicants.

## PROVISIONAL SPECIFICATION

### An Improved Hydraulic Relief Valve

We, THE PLESSEY COMPANY LIMITED, a British Company, of 56, Vicarage Lane, Ilford, Essex, do hereby declare this invention to be described in the following statement:—

This invention relates to a hydraulic relief valve.

According to this invention the hydraulic relief valve consists of a valve body which contains a removable valve guide, said guide is formed with a valve seating and discharge outlets, a spring loaded needle or like valve moves axially within the valve guide and is normally held upon its seating by spring loading, said relief valve is characterised in that it can be used as a simple relief valve or alternatively as a differential valve by varying the effective area upon which the pressure of liquid acts upon the valve in opposition to its spring loading.

The term "effective area" in this specification is intended to infer that, when the valve is used as a differential valve, the pressure of liquid upon reaching a predetermined pressure, lifts the valve off its seating and pressurised liquid then acts upon an additional surface of the valve, whereby it is opened fully in opposition to the spring loading and results in a fall in pressure.

The valve stem may be fitted with rubber rings to obviate the valve from what is commonly known as "chattering".

The preferred method of altering the relief valve as a simple relief valve or a

differential valve or *vice versa* is to change the valve guide. The valve guide for the former purpose has the discharge outlets immediately behind the valve seating whereas in the latter case they are situated behind the effective area of the needle or like valve.

According to one embodiment of this invention.

A valve body cast from suitable metal or alloy is formed with an inlet, an outlet for the admission and discharge of pressurised liquid, and one end of said valve body is open to accommodate the valve components.

A valve guide with an internal valve seating, and (when used as a simple relief valve) has a series of circumferential apertures immediately behind the valve seating. Said valve is removably fitted to the valve body in such a manner that the pressurised liquid can flow through the apertures from the inlet to discharge.

A stepped face needle valve moves axially in the valve guide on to the valve seating formed therein. Said valve has a central bore to receive a spindle. The portion inserted into the valve has several circular grooves and rubber rings are fitted into these grooves which are a close fit with the bore. Abutting against the outer end of the valve is a thimble. A compression spring inserted over the valve spindle engages at one end, a flange formed upon the thimble, and at the other end a nut, cap or the like screwed on to the end of the valve guide,

whereby the valve is normally held upon its seating under the compression of the spring loading. The compression of the spring can be varied by turning the nut 5 or the like in an anti-clockwise or clockwise direction.

With this construction the circumferential ring of apertures are adjacent to the rear stepped portion of the valve. 10 When the valve is intended to be used as a differential one, the valve components are removed from the valve body and the valve guide is replaced together

with the other components by a valve guide having a series of discharge outlets 15 which are off-set in relation to the stepped portion of the valve.

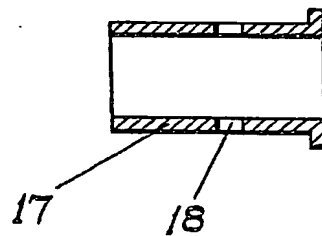
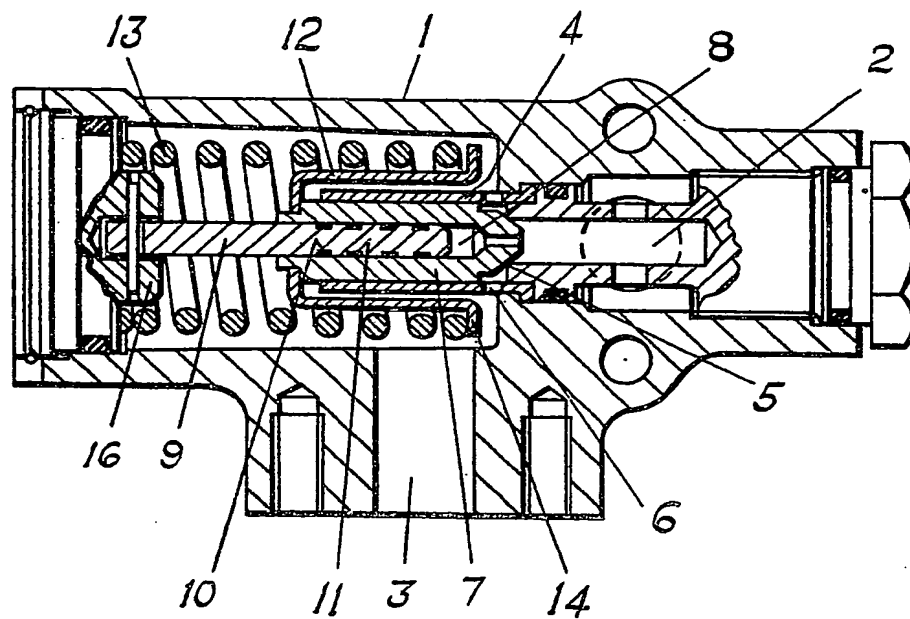
In either arrangement the rubber rings on the valve stem are pressed against the surface of the valve bore 20 under the influences of the pressures acting upon the valve, thus eliminating "chatter".

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**1 SHEET**

FIG.1.



**FIG.2.**